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Entergy: Our Bay is Not Your Dump (2015 Water Pollution Report)

A call to EPA and MassDEP to terminate Entergy's Clean Water Act permit for Pilgrim Nuclear and end the destruction and pollution of Cape Cod Bay

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This is a call to state and federal regulators to terminate Entergy's Clean Water Act "National Pollutant Discharge Elimination System" (NPDES) permit for Pilgrim Nuclear Power Station in Plymouth, Massachusetts. Entergy's NPDES permit expired in 1996, over 19 years ago. Under the guise of the NPDES permit, Pilgrim's outdated "once-through" cooling water intake structure (CWIS) has been destroying marine resources in Cape Cod Bay and polluting our water since 1972. Cape Cod Bay and its natural resources belong to the public. The Bay is not Entergy's private dump, nor its to destroy.

The call to terminate Entergy's Clean Water Act NPDES permit for the Pilgrim Nuclear Power Station is endorsed by the following organizations:

Association to Preserve Cape Cod
Beyond Nuclear
Biofuelwatch
Boston Downwinders
Cape Cod National Seashore Advisory Commission
Cape Downwinders
Clean Water Action
Concerned Neighbors of Pilgrim



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Report: Notes and Citations (1-97)

(1) Pilgrim reportedly kills an estimated annual average of 14.5 million fish and 160 billion blue mussels; Stratus Consulting. 2002. *Habitat-based replacement costs: An ecological valuation of the benefits of minimizing impingement and entrainment at the cooling water intake structure of the Pilgrim Power Generating Station in Plymouth, Massachusetts*. Report for U.S. EPA, Region 1. 133 pp.; This study looked at fish and mussels using 1974-1999 data, and age-1 equivalent losses. ([Source PDF](#))

(2) Maurer W. and Boyle B. 2015. PNPS Efficiency Review. ([Source PDF](#))

(3) Entergy is an affiliate of Entergy Nuclear Operations, Inc., a Louisiana-based corporation with annual revenues of about US\$11 billion in 2013. Wikinvest. Entergy stock statement. ([Source](#))

(4) For more information, see *How it works: water for power plant cooling*, Union of Concerned Scientists. ([Source](#)); Pilgrim Watch. 2014. *Pilgrim Risks: Accidents and Daily Operations*. ([Source PDF](#))

Pilgrim's use of large volumes of water for its operations is essentially the same method of power generation used at a fossil fuel plant. That is why power plants – nuclear or coal – are located on large bodies of water, such as rivers, lakes, or the ocean: they need water to remove waste heat. Instead of burning fossil fuels such as coal or natural gas to make steam, Pilgrim splits atoms that are contained in pellets of uranium. Pilgrim also uses the Town of Plymouth's municipal water supply. From 2003 to 2013, Pilgrim's use made up about 2.5-9.0% of the total amount of water used by the Town of Plymouth: about 1.6B to 1.8B gallons per year. Source: Town of Plymouth, Water Division. 2014. ([Source PDF](#))

(5) Maurer W. and Boyle B. 2015. *PNPS Efficiency Review*. ([Source](#))

(6) New York Times. 1988. *Restart approved at nuclear plant*. ([Source](#)); U.S. Committee on Labor and Human Resources. 1988. *Hearing before the Committee on Labor and Human Resources United States Senate on Restart of the Pilgrim I Nuclear Power Plant*. Plymouth, MA. 876 pp. ([Source PDF](#))

(7) *Nuclear power in an age of uncertainty*. 1984. Washington, D.C.: U.S. Congress, Office of Technology Assessment, OTA-E-216. ([Source PDF](#))

(8) New York Times. 1989. *Pilgrim reactor started after 3-year shut down*. ([Source](#))

(9) In addition to operating Pilgrim, Entergy has an Independent Spent Fuel Storage Installation (ISFSI) at Pilgrim for storing high-level nuclear waste on site indefinitely. Entergy began building this "dry cask" facility in 2012. Some of the 42 years' worth of nuclear waste was moved to dry casks in early 2015. Entergy's failure to comply with local zoning for the facility is currently the subject of a legal appeal. See: ([Source](#))

(10) Cape Cod Times. Nov. 9, 2013. *NRC boss: Pilgrim headed for trouble*. ([Source PDF](#))

(11) Power Engineering. Jan. 9, 2014. *NRC lowers Pilgrim nuclear plant performance to "degraded."* ([Source](#)); Cape Cod Times. Mar. 18, 2015. *Activists, supporters sound off on Pilgrim nuclear plant*. ([Source](#))

(12) Gunter L., Gunter P., Cullen S., and N. Burton. 2001. *Licensed to Kill: How the nuclear power industry destroys endangered marine wildlife and ocean habitat to save money*. ([Source](#))

(13) Hanson C.H., White J.R., and H.W. Li. Oct. 1977. Entrapment and impingement of fishes by power plant cooling-water intakes: an overview. *Marine Fisheries Review*. 11 pp. ([Source PDF](#))

(14) Stressful conditions can result in increases lactic acid in tissues leading to muscle fatigue and suffocation; Dominy C.L. 1971. *Changes in blood lactic acid concentrations in alewives (Alosa pseudoharellus) during passage through a pool and weir fishway*. J. Fish. Res. Board Can. 28: 1215-1217. (See abstract: [Source](#))

(15) Radioactive toxins are deliberately/accidentally released from power plants into water sources (Beyond Nuclear. Apr. 2010. *Leak First, Fix Later*. p. 5); ([Source](#))

"Liquid radioactivity is released from PNPS to Cape Cod Bay via the circulating water discharge canal. These effluents enter Cape Cod Bay at the outfall of the canal, which is located about 1100 feet north of the reactor building."(PNPS, Radioactive Effluent and Waste Disposal Report. Jan. 1-Dec. 31, 2000. Section 2.3.); ([Source PDF](#))

In 2013, Pilgrim discharged radioactive toxins including chromium-51, manganese-54, iron-55, iron-59, cobalt-50, cobalt-58, cobalt-60, zinc-65, zirconium/niobium-95, molybdenum/technetium-99, silver-110M, antimony-124, cesium-137. (Entergy Annual Report 2013. Table 2.3-B, Batch Mode Releases); Pilgrim also leaks a range of toxins into soil/groundwater. (Entergy Annual Report 2013. p. 70.) ([Source](#))

The NPDES permit does not regulate Entergy's discharge of radioactivity to the Bay. State law controls discharges, but MassDEP has ignored its responsibility to ensure Entergy meets water quality standards for radioactive substances set forth in 314 CMR 4.0 (5)(d). These releases are only subject to "self-reporting" by Entergy to NRC, which merely sets "acceptable limits" for discharging radioactive toxins. Limits are based on harm to humans (and are inadequate in any event.) Even if Entergy meets NRC's "acceptable limits," the radioactivity may be harming the environment or marine resources. Testing marine life for cumulative impacts and concentrations of Entergy's radioactive toxins has been inadequate or non-existent.

(16) The Federal Water Pollution Control Act was first passed in 1972 and is known as the "Clean Water Act." 33 U.S.C. § 1311, 1312, 1341 and 1342. Massachusetts has had water pollution control laws on the books since the 1960s. The current state law is known as the "Clean Waters Act." Mass. General Laws, Chapter 21, Sections 26-53.

(17) Pilgrim 1991 NPDES permit.

(18) For example, see a Jul. 2013 study of closed-cycle cooling options for the Diablo Canyon Nuclear Plant in California. Bechtel Power Corporation. 2013. Final Technologies Assessment for the Alternative Cooling Technologies or Modifications to the Existing Once-Through Cooling System for Diablo Canyon Power Plant (Draft). Report No. 25762-0003H-G01G-0001. ([Source PDF](#))

(19) The Notice of Intent to Sue under the Clean Water Act identified 33,000 violations at Pilgrim. Entergy responded by threatening to sue the residents. When MassDEP and EPA promised to renew the NPDES permit by Dec. 2013, the residents put the lawsuit on hold. See, Notice of Intent to Sue under the Clean Water Act, Oct. 5, 2012. ([Source PDF](#)); Residents also sent MassDEP a notice of damage to the environment under to MassDEP alleging violations of the state Clean Waters Act and Article 97 of the Mass. Constitution which provides the right to clean water and environment. See, Oct. 5, 2012 letter to MassDEP. ([Source PDF](#))

(20) Letter to U.S. EPA from Cape Cod Bay Watch, Jan. 28, 2014. Re: Re: Pilgrim Nuclear Power Station, Plymouth, Massachusetts: Expired Clean Water Act NPDES Permit No. MA0003557.([Source PDF](#))

(21) Letter to Cape Cod Bay Watch from U.S. EPA, Feb. 27, 2014. ([Source PDF](#))

- (22) ASLB Order, LBP -12-16, July 20, 2012, p. 20, footnote 76. ([Source PDF](#))
- (23) NRC Voting Record. 2012. Renewal of full-power operating license for Pilgrim Nuclear Power Station. ([Source PDF](#))
- (24) Simckowitz J. 2012. *Senator Wolf decries relicensing of Pilgrim Nuclear Plant.* (press release) Barnstable-Hyannis Patch. ([Source PDF](#))
- (25) 1994 modification to Pilgrim's 1991 NPDES permit, Part II, Section A, Part 6 (p. 3). (The permit does not "[d]oes not convey any property rights of any sort, or any exclusive privilege.") ([Source PDF](#))
- (26) This law prohibits "dumping or discharge of ...industrial wastes" is prohibited except under certain circumstances that do not apply to Pilgrim. Mass. General Laws, Chapter 132A, Section 15(4) and Section 13. ([Source](#))
- (27) Mass. Surface Water Quality Standards, 314 Code Mass. Regulations, Part 4.00, Section 4.05(4)(a). ([Source PDF](#))
- (28) NOAA Fisheries. Feb. 13, 2015. Press release: *NOAA proposes to expand critical habitat for endangered North Atlantic right whales.* ([Source](#))
- (29) 310 CMR 9.00; Also see: Cape Cod Bay Watch. 2015. New Project at Pilgrim Threatens the Safety of Our Families, Homes, and the Environment. ([Source](#))
- (30) Cape Cod Bay Watch. 2015. *History of Tidelands.* ([Source](#))
- (31) Mass. General Laws, Chapter 21, Sections 26-53.
- (32) Azmi S., et al. 2015. *Monitoring and trend mapping of sea surface temperature (SST) from MODIS data: a case study of Mumbai coast.* Environmental Monitoring and Assessment. 187:165 ([Source PDF](#)); Oviatt C.A. 2004. *The changing ecology of temperate coastal waters during a warming trend.* Estuaries. (27)6: 895-904. ([Source PDF](#))
- (33) Including metabolic rates, population growth, distribution and abundance of prey, including phenology and productivity, and population connectivity; Oviatt C.A. 2004. *The changing ecology of temperate coastal waters during a warming trend.* Estuaries. (27)6: 895-904. ([Source PDF](#)); Hoegh-Guldberg O., et al. 2010. *The impact of climate change on the world's marine ecosystems.* Science. (328): 1523-1528. ([Source PDF](#))
- (34) WCAL. 2012. *Cape change: A local perspective on global warming.* ([Source](#)); National Geographic. 1996-2012. *Sea temperature rise: Warmer oceans have far-reaching effects.* ([Source](#)); Oviatt C.A. 2004. *The changing ecology of temperate coastal waters during a warming trend.* Estuaries. (27)6: 895-904. ([Source PDF](#))
- (35) Hoegh-Guldberg O., et al. 2010. *The impact of climate change on the world's marine ecosystems.* Science. (328): 1523-1528. ([Source PDF](#))
- (36) Section 316 of the Federal Water Pollution Control Act of 1972, 33 U.S.C. § 1251 et seq. ([Source PDF](#))

- (37) Pilgrim Watch. 2014. *Pilgrim Risks: Accidents and Daily Operations*. p. 45, Marine Impact. ([Source PDF](#))
- (38) Pilgrim's 1991 NPDES Permit No. MA0003557, p. 6. ([Source PDF](#))
- (39) 3,000 acres, up to 1°C Δ; Entergy. 2000. Pilgrim Nuclear Power Station Supplemental §316 Demonstration Report. ([Source PDF](#))
- (40) EEA and the Adaptation Advisory Committee. 2011. Massachusetts climate change adaptation report. 128 pp. ([Source PDF](#))
- (41) CCS. 2014. Cape Cod Bay. ([Source](#))
- (42) NRC. Jul. 16-17, 2013 Event Reports. ([Source PDF](#))
- (43) In Jul. 2013, the NRC approved Millstone unit 3 to use water as warm as 80°F, up from 75°F. The agency approved a similar request for the Millstone unit 2 in Apr. 2013.
- (44) Personal communication from Robert Brown, Attorney, MassDEP.
- (45) This does not include mechanical damage. Bridges W.L. and R.D. Anderson. *A brief survey of Pilgrim Nuclear Power Plant effects upon the marine aquatic environment*. In: *Observations on the ecology and biology of western Cape Cod Bay, Massachusetts*. 1984. Eds, Davis, J.D. and D. Merriman. Springer-Verlag.
- (46) Permit No. MA 003557, A.1.(a)(2)
- (47) For example, in Jun. 2011, the temperature was 97.7°F (36.5°C) and in Jul. 2010, the temperature 99°F (37.2°C) as reported in Entergy's Discharge Monitoring Reports. See Entergy's Jun. 2011 DMR ([Source PDF](#)) and Jul. 2010 DMR ([Source PDF](#))
- (48) Lawton B., Maietta R., Paar J., and G. Szal. Jan. 3, 2000. *Memo: Recommendations and concerns of federal and state representatives on the Pilgrim Station modeling sub-committee for 2000*. ([Source PDF](#))
- (49) Lawton R., et al. Mass Division of Marine Fisheries. Dec. 30, 1992. Drafted for Boston Edison. Pilgrim Nuclear Power Station, Marine Environmental Monitoring Program, Report Series No. 5. *Final Report on Irish moss (Chondrus crispus) harvesting along the Plymouth shoreline and impact assessment of Pilgrim Station on the fishery, 1971-1982*. 37 pp. ([Source PDF](#))
- (50) ENSR. 1997. *Benthic algal monitoring at the Pilgrim Nuclear Power Station (qualitative transect surveys), January-December 1996*. Draft Semi-Annual Report to Boston Edison, No. 49. ([Source PDF](#))
- (51) Szal G.M. Dec. 5, 2005. Technical Memorandum for the Record. *Pilgrim Nuclear Power Station: review of intake and discharge effects to finfish*. In: *South Shore Coastal Water Quality Assessment Report*. ([Source PDF](#))
- (52) Boston Edison. June 1980. *Benthic Map Overlays and Assessment of Benthic Monitoring Programs* [Vol. 1]. Pilgrim Nuclear Power Station. Nuclear Engineering Dpt. Environmental Sciences Group. 49 pp. ([Source PDF](#)); Szal G.M. Dec 5, 2005. Technical memorandum for the record. *Pilgrim Nuclear Power Station: review of intake and*

discharge effects to finfish. Appendix G. In: *South Shore Coastal Water Quality Assessment Report.* ([Source PDF](#))

(53) Entergy Nuclear Generation Company v. MassDEP, 459 Mass 319 (2011). “In addition, States retain the right to impose pollution control limits that are more stringent than the “floor” set by Federal law....Before a Federal permit may issue, the relevant State first must certify that the permittee’s activities will not violate the State’s water quality standards...This “State certification” process ensures that holders of Federal permits respect and uphold State standards....The State Act, G. L. c. 21, §§ 26-53, confers on the department “the duty and responsibility . . . to enhance the quality and value of water resources and to establish a program for prevention, control, and abatement of water pollution.” G. L. c. 21, § 27. Like the Federal Act, the State Act creates a comprehensive permitting program to ensure water quality standards are met. *Id.* at §§ 27 (6), 43-44. No one may “discharge pollutants . . . [or] engage in any other activity that may reasonably be expected to result, directly or indirectly, in discharge of pollutants into waters of the [C] ommonwealth . . . without a currently valid permit” issued by the department. *Id.* at § 43 (2). Permits may include not only discharge limitations but also any “additional requirements . . . necessary to safeguard the quality of the receiving waters.” *Id.* at § 43 (7). Violation of the terms of a permit is punishable by civil and criminal penalties. *Id.* at § 42.” Despite the strong message the state’s highest court has sent to MassDEP, it continues to shirk its responsibilities to enforce state water quality standards with regard to Pilgrim.

(54) Federal Water Pollution Control Act, 33 USCS 1341. ([Source PDF](#))

(55) Mass. Surface Water Quality Standards, 314 CMR 4.0(5)(d) and 4.05(4)(a). ([Source PDF](#))

(56) JRWA and Pilgrim Watch contention on “(1) Violations of state and federal clean Water Laws, (2) Lack of Valid State § 401 Water Quality Certification; (3) Violation of State Coastal Zone Management Policy; and (4) Violation of NEPA,” filed May 14, 2012. ([Source PDF](#))

(57) NRC Atomic Safety and Licensing Board, Memorandum and Order, ASLBP 12-291-08-LR-BD01, July 20, 2012, page 9.

(58) Letter to state officials from EcoLaw, Oct. 5, 2012. Re: Written Notification of Damage to the Environment, G.L. c. 214, § 7A Pilgrim Nuclear Power Station, Plymouth, MA: NPDES Permit No. MA 0000355. ([Source PDF](#))

(59) The expert federal agencies are the USFWS (responsible for terrestrial and fresh water fish species) and NOAA Fisheries (responsible for most marine species).

(60) JRWA petitions for leave to intervene and file new contentions under 10 C.F.R. § 2.309(a)/(d) or in the alternative 10 C.F.R. § 2.309(e) and JRWA and Pilgrim Watch motion to reopen under 10 C.F.R. § 2.326 and request for a hearing under 10 C.F.R. §2.309(a)/(d). Mar. 8, 2012. Docket #50-293 LR. ([Source PDF](#))

(61) In Cape Cod Bay and Coastal Zone Management Areas (Barnstable and Plymouth counties only). State-listed rare species include those with special concern, threatened,

endangered status as of 2012; includes flora and fauna. Based on data requested from the Natural Heritage and Endangered Species Program of the MA Division of Fisheries and Wildlife, 2012.

(62) Pettis H. 2013. *North Atlantic Right Whale Consortium 2013 annual report card*. Report to the North Atlantic Right Whale Consortium, Nov. 2013. ([Source PDF](#))

(63) Cape Cod Bay, Great South Channel, Bay of Fundy, and Roseway Basin; Pendleton D.E., et al. 2012. *Weekly predictions of North Atlantic right whale Eubalaena glacialis habitat reveal influence of prey abundance and seasonality of habitat preferences*. Endangered Species Research. Vol. 18, p. 147-161. ([Source PDF](#))

(64) Mass. Ocean Management Task Force Technical Report. 2004. *Estuarine and Marine Habitat*. p. 101-127. ([Source PDF](#)); Mayo C.A., et al. 2004. *Surveillance, monitoring, and management of North Atlantic right whales in Cape Cod Bay and adjacent waters – 2004*. Final report submitted to the Commonwealth of Mass., Division of Marine Fisheries. Center for Coastal Studies, Nov. 2004. ([Source PDF](#)); Delorenzo A.S. 2005. *An assessment of the habitat quality and nutritional intake of North Atlantic right whales in Cape Cod Bay*. Dissertations and Master's Theses from the University of RI. Paper AAI3186903. (See abstract: [Source PDF](#))

(65) Declaration of Regina Asmutis-Silvia, Whale and Dolphin Conservation, regarding the Jan. 2013 sighting of Wart and calf in Cape Cod Bay. Mar. 21, 2013. ([Source PDF](#))

(66) Memo to Jones River Watershed Association, Kingston, MA from Charles "Stormy" Mayo, Ph.D., Senior Scientist, Director, Right Whale Habitat Studies, Senior Advisor, Whale Disentanglement Program, Center for Coastal Studies, Provincetown, MA. Apr. 12, 2012. ([Source PDF](#))

(67) Affidavit of I.C.T Nisbet. Apr. 30, 2012. From: JRWA and Pilgrim Watch request to reopen, for a hearing, and to file new contentions and JRWA motion to intervene on issues of: (1) violations of state and federal clean water laws; (2) lack of valid state §401 Water Quality Certification; (3) violations of state Coastal Zone Management policy; and (4) violation of NEPA. ([Source PDF](#))

(68) 16 U.S.C. 1801 et seq.

(69) For a full list of species, see the NOAA Fisheries Habitat Conservation Division website at: ([Source](#))

(70) NRC. *Generic Environmental Impact Statement for license renewal of nuclear plants. Supplement 29 regarding Pilgrim Nuclear Power Station*. NUREG-1437, Supplement 29. Vol. II (Appendices). See page E-15 for NOAA Fisheries Comments. ([Source PDF](#))

(71) Entergy. 2000. Pilgrim Nuclear Power Station Supplemental §316 Demonstration Report to EPA. (See #39 – [Source PDF](#))

(72) Letter to EPA from MassCZM, Jun. 27, 2000. Re: MCZM review of the Entergy-Pilgrim Station §316 Demonstration Report. ([Source PDF](#))

(73) Entergy's area-swept study was performed for the 20th consecutive year in 2014.

(74) Letter to Entergy from EPA, Mar. 23, 2000, regarding the 2000 marine fish monitoring programs and plans for Pilgrim Nuclear Power Station. ([Source PDF](#))

(75) Entergy. 1999. *Final report on rainbow smelt (Osmerus mordax) restoration efforts in the Jones River, 1994-1999*. PNPS Marine Environmental Monitoring Program, Report Series No. 8. (Mass. DMF, Lawton R. and J. Boardman) ([Source PDF](#))

(76) NOAA. 2007. *Species of concern: rainbow smelt (Osmerus mordax)*. Fact sheet. ([Source PDF](#))

(77) MassDMF. 2006. *Rainbow smelt (Osmerus mordax) spawning habitat on the Gulf of Maine coast of Massachusetts*. Technical Report TR-30. ([Source PDF](#))

(78) Based on data from 1974-1999; Stratus Consulting. 2002. *Habitat-based replacement costs*. Report for the U.S. EPA, Region 1. ([Source PDF](#))

(79) 16 U.S.C. 1452, § 303 (1) and (2)

(80) 301 CMR Section 20.00 to 26.00

(81) Letter to EPA from MassCZM, Jun. 27, 2000. Re: MCZM review of the Entergy-Pilgrim Station §316 Demonstration Report. (See #72 – [Source PDF](#))

(82) JRWA and Pilgrim Watch contention on “(1) Violations of state and federal clean Water Laws, (2) Lack of Valid State § 401 Water Quality Certification; (3) Violation of State Coastal Zone Management Policy; and (4) Violation of NEPA,” filed May 14, 2012. (See #56 – [Source PDF](#))

(83) Letter to MassCZM from JRWA and Pilgrim Watch, Apr. 4, 2012. Re: MCZM July 11, 2006 Consistency Certification for Entergy's Nuclear Pilgrim Nuclear Power Station, Plymouth, MA. ([Source PDF](#))

(84) Communication from MassDEP attorney Robert Brown.

(85) Entergy v. MassDEP, 459 Mass. 319, page 332 (2011), citing Riverkeeper, Inc. v. U.S. EPA, 475 F. 3d 83, 90 (2007). ([Source PDF](#))

(86) Letter to NRC from EPA, Jul. 10, 2014. Re: Clean Water Act permit for Pilgrim Station in Plymouth, MA, and nuclear safety issues alleged by the facility. ([Source PDF](#))

(87) MassDMF. Jun. 21, 1994. Memo to the PACT. Re: Minutes from the 81st meeting of the A-T Committee. p. 2. ([Source PDF](#))

(88) Letter to EPA from Szal G.M. (PATC), Dec. 8, 1998. Re: Pilgrim Nuclear Power Plant. ([Source PDF](#))

(89) Oct. 5, 2012 Notice of Intent to Sue Letter, p. 12. (See #19 – [Source PDF](#))

(90) For example, rainbow smelt spawning habitat enhancement in the Jones River. See: Entergy, 1999. *Final report on rainbow smelt (Osmerus mordax) restoration efforts in the Jones River, 1994-1999*. PNPS Marine Environmental Monitoring Program, Report Series No. 8. (Mass. DMF, Lawton R. and J. Boardman)

(91) Oct. 5, 2012 Notice of Intent to Sue Letter, p. 12. (See #19 – [Source PDF](#))

(92) Entergy's discharge of *tolyltriazole* was theoretically "approved" in a letter from the EPA in 1995, long after Pilgrim's permit was finalized and outside of the normal permit modification process. Beginning in Feb., 2014 a leak was discovered associated with a valve attached to a "Fire Water Tank," which discharged trace amounts of sodium nitrite (a corrosion inhibitor and additive to industrial greases) and tolyltriazole into Cape Cod Bay from Pilgrim's outfall #001. Even if the discharges were lawfully within the NPDES permit, they discharges are allowed only through outfall #011, not outfall #001, where the leak occurred.

(93) NRC. *Generic Environmental Impact Statement for license renewal of nuclear plants. Supplement 29 regarding Pilgrim Nuclear Power Station*. NUREG-1437, Supplement 29. Vol. II (Appendices). See page E-15 for NOAA Fisheries Comments. (See #70 – [Source PDF](#))

(94) Letter to EPA from MassCZM, Jun. 27, 2000. Re: MCZM review of the Entergy-Pilgrim Station §316 Demonstration Report. (See #72 – [Source PDF](#))

(95) Letter to EPA from Szal G.M. (PATC), Dec. 8, 1998. Re: Pilgrim Nuclear Power Plant. ([Source PDF](#))

(96) Letter to Boston Edison from MassDEP (PATC), Oct. 15, 1998, regarding a number of recent recommendations of the A-T Committee regarding monitoring, plant impacts and fisheries habitat restoration. ([Source PDF](#))

(97) EPA. Mar. 2001. *Essential fish habitat assessment for reissuance of the discharge permit for the Pilgrim Nuclear Power Plant*. Draft Report submitted to NOAA Fisheries. 14 pp. ([Source PDF](#))

Appendix: Notes and Citations (1-61)

(1) The water passes through trash racks (a grid of vertical metal bars), then through four mesh intake, or traveling, screens (1/2 x 1/4 inch mesh); Normandeau Associates. Oct. 2014. *Impingement of organisms on the intake screens at Pilgrim Nuclear Power Station, Jan. – Jun. 2014*. Submitted to Entergy Nuclear PNPS, Semi-annual Marine Ecology Studies. ([Source PDF](#))

(2) Hanson C.H., White J.R., and H.W. Li. Oct. 1977. *Entrapment and impingement of fishes by power plant cooling-water intakes: an overview*. Marine Fisheries Review. 11 pp. ([Source PDF](#))

(3) Stressful conditions can result in increases lactic acid in tissues leading to muscle fatigue and suffocation. Dominy C.L. 1971. *Changes in blood lactic acid concentrations in alewives (Alosa pseudoharellgus) during passage through a pool and weir fishway*. J. Fish. Res. Board Can. 28: 1215-1217. ([Source](#))

(4) River herring is an umbrella term for alewife, *Alosa pseudoharengus*, and blueback herring, *A. aestivalis*. River herring play an important role in the culture, ecology and economies of coastal towns in Mass. River herring are in decline along the Atlantic coast

primarily due to overfishing, predation and habitat loss. The Mass. Division of Marine Fisheries established a three-year moratorium on the sale and harvest of river herring throughout the state in 2005. In 2008 the moratorium was extended through 2011 because of a lack of recovery of river herring. Since 2012 the moratorium has been extended under the oversight of the Atlantic States Marine Fisheries Commission. In addition, NOAA Fisheries currently lists blueback herring and alewife as “species of concern.”

(5) Normandeau Associates. Apr. 2013. *Impingement of organisms on the intake screens at Pilgrim Nuclear Power Station, Jan. – Dec. 2012*. In: Entergy Nuclear – Pilgrim Station. 2013. Marine Ecology Studies Jan. 2012 – Dec. 2012, Report No. 81, Section 2.3.; In 2012, the most commonly impinged fish were Atlantic silversides, blueback herring, Atlantic menhaden, butterfish, alewife, Atlantic tomcod, grubby, red hake, winter flounder, black seabass, northern puffer, making up 85% of the total number of fish impinged. ([Source PDF](#))

(6) Entergy. Jan. 20, 2015. Discharge Monitoring Report – December 2014. ([Source PDF](#))

(7) Normandeau Associates. Apr. 2013. *Impingement of organisms on the intake screens at Pilgrim Nuclear Power Station, Jan. – Dec. 2012*. In: Entergy Nuclear – Pilgrim Station. 2013. Marine Ecology Studies Jan. 2012 – Dec. 2012, Report No. 81, Section 2.3. (See #5 – [Source PDF](#))

(8) Normandeau Associates. Oct. 2008. Impingement monitoring, Section 3.3. In: Entergy Nuclear – Pilgrim Station. 2008. Marine Ecology Studies Jan. 2012 – Dec. 2007, Report No. 71. ([Source PDF](#))

(9) Section 4.1.2.1 of the DSEIS. See page A-92: NRC. Generic Environmental Impact Statement for license renewal of nuclear plants. Supplement 29 regarding Pilgrim Nuclear Power Station. NUREG-1437, Supplement 29. Vol. II (Appendices). 642 pp. ([Source PDF](#))

(10) Normandeau Associates. Mar. 2007. Impingement monitoring, Section 3.3. In: Entergy Nuclear – Pilgrim Station. 2007. Marine Ecology Studies Jan. 2006 – Dec. 2006, Report No. 69. ([Source PDF](#))

(11) The percentages provided in this section represent the number of impinged individuals within a species relative to the estimated extrapolated total number of all fish impinged and reported by Entergy. Percentages representing the impinged individuals within a species relative to estimated natural population sizes are not available.

(12) Taxon (pl. taxa) is often used to refer to a number of distinct forms within a family, or other taxonomic grouping, when there is ambiguity as to whether some of those forms are species or subspecies.

(13) Normandeau Associates. Oct. 2008. Impingement monitoring, Section 3.3. In: Entergy Nuclear – Pilgrim Station. 2008. Marine Ecology Studies Jan. 2007 – Dec. 2007, Report No. 71. (See #8 – [Source PDF](#))

- (14) Letter to EPA and MassDEP from Entergy, Sept. 20, 2007. Re: Pilgrim Fish Impingement Incident – Sept. 14-15, 2007, NPDES Permit Number MA0003557.
- (15) Normandeau Associates. Apr. 2009. Impingement monitoring, Section 3.3. In: Entergy Nuclear – Pilgrim Station. 2008. Marine Ecology Studies Jan. 2008 – Dec. 2008, Report No. 73. ([Source PDF](#))
- (16) Entergy. Nov. 2014. Discharge Monitoring Report – October 2014. ([Source PDF](#))
- (17) Entergy. Jan. 20, 2015. Discharge Monitoring Report – December 2014. (See #6 – [Source PDF](#))
- (18) Memo to Jones River Watershed Association, Kingston, Massachusetts from Charles “Stormy” Mayo, Ph.D., Senior Scientist, Director, Right Whale Habitat Studies, Senior Advisor, Whale Disentanglement Program, Center for Coastal Studies, Provincetown, Massachusetts. Apr. 12, 2012. ([Source PDF](#))
- (19) Toner R.C. *Zooplankton of western Cape Cod Bay*; Toner R.C. *Phytoplankton of western Cape Cod Bay*. Both in: *Observations on the ecology and biology of western Cape Cod Bay, Massachusetts*. 1984. Eds, Davis, J.D. and D. Merriman. Springer-Verlag. ([Source PDF](#))
- (20) Normandeau Associates. Apr. 2013. *Impingement of organisms on the intake screens at Pilgrim Nuclear Power Station, Jan. – Dec. 2012*. In: Entergy Nuclear – Pilgrim Station. 2013. Marine Ecology Studies Jan. 2012 – Dec. 2012, Report No. 81, Section 2.3 (See #5 – [Source PDF](#))
- (21) Lawton R., et al. 2000. *Winter flounder (Pseudopleuronectes americanus) studies (1993-1999) in relation to impact assessment of Pilgrim Station on the local population*. PNPS Marine Environmental Monitoring Program Report Series No. 10. Dpt. of Fisheries, Wildlife and Environmental Law Enforcement. Mass. Division of Marine Fisheries. 51 pp. ([Source PDF](#))
- (22) Entergy. 2000. Pilgrim Nuclear Power Station Supplemental §316 Demonstration. ([Source PDF](#))
- (23) Letter to EPA from MassCZM, Jun. 27, 2000. Re: MCZM review of the Entergy-Pilgrim Station §316 Demonstration Report. ([Source PDF](#))
- (24) Letter to EPA from Szal G.M. (PATC), Dec. 8, 1998. Re: Pilgrim Nuclear Power Plant. ([Source PDF](#))
- (25) Entergy’s 1983 NPDES permit ([Source PDF](#))
- (26) Lawton B., Maietta R., Paar J., and G. Szal. Jan 3, 2000. Memo: Recommendations and concerns of federal and state representatives on the Pilgrim Station modeling sub-committee for 2000. ([Source PDF](#))
- (27) PATC. Jan. 6, 2000. Meeting minutes from the 93rd meeting of Pilgrim’s Administrative-Technical Committee. ([Source PDF](#))

(28) Lawton B., Maietta R., Paar J., and G. Szal. Jan. 3, 2000. Memo: Recommendations and concerns of federal and state representatives on the Pilgrim Station modeling sub-committee for 2000. (See #26 – [Source PDF](#))

(29) EPA. Feb. 28, 2007. Comments to NRC regarding the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 29 Regarding the Pilgrim Nuclear Power Station, Draft Report for Comment (CEQ #20060510). ([Source PDF](#))

(30) NRC. Generic Environmental Impact Statement for license renewal of nuclear plants. Supplement 29 regarding Pilgrim Nuclear Power Station. NUREG-1437, Supplement 29. Vol. II (Appendices). 642 pp. (See page E-132). (See #9 – [Source PDF](#))

(31) EPA. Feb. 28, 2007. Comments to NRC regarding the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 29 Regarding the Pilgrim Nuclear Power Station, Draft Report for Comment (CEQ #20060510). (See #29 – [Source PDF](#))

(32) NRC. Generic Environmental Impact Statement for license renewal of nuclear plants. Supplement 29 regarding Pilgrim Nuclear Power Station. NUREG-1437, Supplement 29. Vol. II (Appendices). 642 pp. (See page E-15 for NOAA Fisheries Comments). (See #9 – [Source PDF](#))

(33) Dominy C.L. 1971. *Evaluation of a pool and weir fishway for passage of alewife (Alosa pseudoharengus) at White Rock, Gaspereau River, Nova Scotia*. Canada Department of Fisheries and Forestry, Resource Development Branch, Progress Report No. 3, Halifax, Canada. ([Source](#))

(34) EPA. March 2001. *Essential fish habitat assessment for reissuance of the discharge permit for the Pilgrim Nuclear Power Plant*. Draft Report submitted to NOAA National Marine Fisheries Service. 14 pp. ([Source PDF](#))

(35) Letter to EPA from Szal G.M. (PATC), Dec. 8, 1998. Re: Pilgrim Nuclear Power Plant. (See #24 – [Source PDF](#))

(36) For example, Pilgrim's annual capacity factor for 2010 was 98.5%, 77.8% in 2011 (Jan.-Jun only), and 98.0% in 2012. See Entergy's Marine Ecology Studies for Pilgrim Nuclear Power Station, Report No. 77 (2010 Annual Report, [Source PDF](#)), No. 78 (2011 Semi-annual Report, [Source PDF](#)), and No. 81 (2012 Annual Report, [Source PDF](#)).

(37) According to a report commissioned by Entergy, recapture rates remained low in subsequent years: 0.12% in 2001, 0.13% in 2002, and 1.2% in 2003.

(38) Crossman J.A., et al. 2011. *Hatchery rearing environment and age affect survival and movements of stocked juvenile lake sturgeon*. Fisheries Management and Ecology. 18: 132-144. ([Source PDF](#))

(39) ([Source](#))

(40) Marine Research, Inc. Feb. 2005. *Hatchery production study young-of-the-year winter flounder post-release collections 2000 – 2004*. 52 pp. ([Source PDF](#))

(41) Barnstable and Plymouth counties only, includes flora and fauna. Based on data requested from the Natural Heritage and Endangered Species Program of the MA Division of Fisheries and Wildlife. ([Source](#))

(42) Letter to NRC from NOAA Fisheries, Jan. 28, 2004. Re: Docket No. 52-009. ([Source PDF](#)); NOAA Fisheries. Feb. 6, 2012. Final Rule. Endangered and Threatened Wildlife and Plants; Threatened and Endangered Status for Distinct Population Segments of Atlantic Sturgeon in the Northeast Region. 77 FR 5880. Vol. 77, No. 24. ([Source PDF](#))

(43) NOAA Fisheries. Technical Expert Working Group for River Herring. ([Source](#))

(44) Normandeau Associates. Apr. 2013. *Impingement of organisms on the intake screens at Pilgrim Nuclear Power Station, Jan. – Dec. 2012*. In: Entergy Nuclear – Pilgrim Station. 2013. Marine Ecology Studies Jan. 2012 – Dec. 2012, Report No. 81, Section 2.3. (See #5 – [Source PDF](#))

(45) NOAA Fisheries works with [USFWS](#) to manage ESA-listed species. Generally, NOAA Fisheries manages marine species, while USFWS manages land and freshwater species. ([Source](#))

(46) Whale and Dolphin Conservation, Jones River Watershed Association, Congressman Ed Markey, and others sent letters to NOAA Fisheries and/or the NRC regarding issues with the NRC's 2006 Biological Assessment for Pilgrim as well as problems with NRC Staff 2007 Generic Environmental Impact Statement.

(47) JRWA petitions for leave to intervene and file new contentions under 10 C.F.R. § 2.309(a)/(d) or in the alternative 10 C.F.R. § 2.309(e) and JRWA and Pilgrim Watch motion to reopen under 10 C.F.R. § 2.326 and request for a hearing under 10 C.F.R. §2.309(a)/(d). Mar. 8, 2012. Docket #50-293 LR. ([Source PDF](#))

(48) Jones River Watershed Association and Pilgrim Watch motion to reopen, request for hearing, and permission to file new contention in the above captioned license renewal proceeding on violations of the endangered species act with regard to the roseate tern. Docket #50-293 LR. May 2, 2012. ([Source PDF](#))

(49) Association to Preserve Cape Cod. Position Statement on Pilgrim Nuclear Power Station. Mar. 17, 2014. ([Source PDF](#))

(50) Mass. Audubon. ([Source](#))

(51) Association to Preserve Cape Cod. Position Statement on Pilgrim Nuclear Power Station. Mar. 17, 2014. ([Source PDF](#))

(52) Pettis H. 2013. *North Atlantic Right Whale Consortium 2013 annual report card*. Report to the North Atlantic Right Whale Consortium, Nov. 2013. ([Source PDF](#))

(53) MA Ocean Management Task Force Technical Report. 2004. Estuarine and Marine Habitat. p. 101-127. ([Source PDF](#)); Mayo C.A., et al. 2004. *Surveillance, monitoring, and management of North Atlantic right whales in Cape Cod Bay and adjacent waters – 2004*. Final report submitted to the Commonwealth of Mass., Division of Marine Fisheries. Center for Coastal Studies. ([Source PDF](#)); Delorenzo A.S. 2005. *An assessment*

of the habitat quality and nutritional intake of North Atlantic right whales in Cape Cod Bay. Dissertations and Master's Theses from the University of RI. Paper AAI3186903. ([Source PDF](#))

(54) Cape Cod Bay, Great South Channel, Bay of Fundy, and Roseway Basin; Pendleton D.E., et al. 2012. *Weekly predictions of North Atlantic right whale Eubalaena glacialis habitat reveal influence of prey abundance and seasonality of habitat preferences*. Endangered Species Research. 18: 147-161. ([Source PDF](#))

(55) MA Audubon. ([Source](#)); Affidavit of I.C.T Nisbet. Apr. 30, 2012. From: JRWA and Pilgrim Watch request to reopen, for a hearing, and to file new contentions and JRWA motion to intervene on issues of: (1) violations of state and federal clean water laws; (2) lack of valid state §401 Water Quality Certification; (3) violations of state Coastal Zone Management policy; and (4) violation of NEPA. ([Source PDF](#))

(56) Project SNOWstorm. Feb. 2, 2014 – Duxbury 2013-2014 map. ([Source](#)); Although the snowy owl is not a federally-listed species, it is protected by the Migratory Bird Treaty Act (as are all the bird species discussed in this section).

(57) Gochfeld, M., Burger J., and I.C. Nisbet. 1998. *Roseate Tern (Sterna dougallii), the birds of North America online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: ([Source](#))

(58) See for example: Normandeau Associates. Apr. 2011. *Impingement of organisms on the intake screens at Pilgrim Nuclear Power Station Jan. – Dec. 2010*. In: Entergy Nuclear – Pilgrim Station. 2011. Marine Ecology Studies Jan. 2010 – Dec. 2010, Report No. 77, Section 3.3. ([Source PDF](#))

(59) NRC Atomic Safety and Licensing Board. Order Denying Petition for Intervention and Request to Reopen Proceeding and Admit New Contention, June 18, 2012. ([Source PDF](#))

(60) Letter to USFWS from Entergy, Feb. 3, 2005. Re: Pilgrim Nuclear Power Station, request for information on threatened and endangered species. ([Source PDF](#))

(61) Affidavit of Nisbet I.C.T. April 30, 2012. U.S. NRC ASLB Docket 50-293-LR, May 2, 2012. From: Jones River Watershed Association and Pilgrim Watch request to reopen, for a hearing, and to file new contentions. (See #55 – [Source PDF](#))

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